

Patent Claims

1. A process for utilizing waste waters, which comprises the following steps:
 - (a) separate collection of gray water and/or black water; and
 - (b) membrane filtration of the gray water separately collected in (a) and/or solids/liquid separation of the black water separately collected in (a).
2. The process according to claim 1 for producing potable water from gray water or one or more of its partial streams, which comprises the following steps:
 - (a) separate collection of gray water or one or more of its partial streams; and
 - (b) membrane filtration of the gray water separately collected in (a) or one or more of its partial streams.
3. The process according to claim 2, wherein membrane filtration is carried out by reverse osmosis or ultrafiltration or microfiltration.
4. The process according to claim 3, wherein ultrafiltration or microfiltration is followed by desalination.
5. The process according to claim 4, wherein membranes having a pore size of at the most up to 2 μm are used for ultrafiltration or microfiltration.
6. The process according to claim 5, wherein membranes having a pore size of at the most 0.2 μm are used for ultrafiltration or microfiltration.

7. The process according to any one of claims 2 to 6, wherein (b) is preceded by one or more mechanical, physical and/or chemical purification steps.
8. The process according to any one of claims 2 to 7, which comprises the following steps subsequent to (a):
 - (i) solids/liquid separation; and/or
 - (ii) carbon removal.
9. The process according to claim 8, wherein step (ii) is followed by solids/liquid separation.
10. The process according to claim 8 or 9, wherein solids/liquid separation is carried out by flotation, sedimentation, filtration or precipitation.
11. The process according to any one of claims 7 to 10, wherein carbon removal is carried out by oxidation by microorganisms.
12. The process according to any one of claims 2 to 11, which comprises the following step subsequent to (b):
 - (c) sanitation and/or modification of the water structure of the gray water recovered in (b) or one or more of its partial streams.
13. The process according to claim 12, wherein sanitation is a chlorination treatment.
14. The process according to claim 1 for utilizing black water, which comprises the following steps:
 - (a) separate collection of black water from toilets with or without urinals;
 - (b) solids/liquid separation of the black water collected in (a);
 - (c) oxidation by microorganisms of the liquid phase recovered in (b);

- (d) solids/liquid separation of the product obtained in (c);
- (e) utilization of the liquid phase obtained in (d) for
 - (ea) collecting black water according to (a); and/or
 - (eb) as mineral fertilizer; and
- (f) optionally repeating steps (a) to (ea) one or more times.

15. The process according to claim 14, wherein black water is collected in (a) separately as faecal and urinal waste water, and the faecal waste water is treated according to steps (a) to (f).

16. The process according to claim 15, wherein at least a part of the urinal waste water is added to the faecal waste water prior to (c).

17. The process according to claim 16, wherein solids/liquid separation in (b) is a flotation process if steps (a) to (ea) are repeated one or more times.

18. The process according to any one of claims 14 to 17, wherein (c) is preceded by one or more mechanical, physical and/or chemical purification steps.

19. The process according to any one of claims 14 to 18, wherein solids/liquid separation in (d) is a filtration process.

20. The process according to any one of claims 14, 15, 18 or 19, wherein solids/liquid separation in (b) is a sedimentation or filtration processes.

21. The process according to any one of claims 14 to 20, wherein the product of (d) is intermediately stored in

a tank, and in the case of higher performance demand is re-supplied to the oxidation apparatus under increased air supply.

22. The process according to any one of claims 14 to 21, wherein the oxidized black water and/or faecal waste water is subjected to sanitation and/or modification of the water structure prior to reutilization.
23. The process according to any one of claims 15 to 22, wherein the solids are removed from the urinal waste water by filtration.
24. The processes according to any one of claims 1 to 23, wherein the solids from the gray water and/or black water and/or faecal waste water are subjected to one or two-step digestion together with or without fragmented bio waste.
25. The process according to any one of claims 2 to 13, wherein the potable water is filled into containers.
26. The processes according to any one of claims 14 to 24, wherein the mineral fertilizer and/or the compost is filled into containers.
27. An apparatus for carrying out the process according to any one of claims 14 to 24, said apparatus comprising a reactor, in which steps (b), (c) and (d) are carried out.
28. The apparatus for carrying out the process according to any one of claims 2 to 13, said apparatus comprising a separator in which the process steps characterized in claims 2 to 13 are carried out.

29. The use of the apparatus according to claim 27 for utilizing black water.

30. The use of the apparatus according to claim 28 for producing potable water from gray water.

Add 317